this met with no acceptance was doubtless due to the improved knowledge of the motions of the planets in the third century, when it was found that there were other irregularities which could not be accounted for by assuming the earth to be in motion.

The book of Aristarchus, now for the first time translated into English, is of great interest to the mathematician because the ratios of the sizes and distances which he calculates are really trigonometrical ratios, sines, cosines, &c., although at the time when the book was written trigonometry had not been invented, and no close approximation to the value of π was known. Aristarchus therefore endeavours to find upper and lower limits for those ratios by assuming propositions comparing the ratio between a greater and a smaller angle in a figure with the ratio between two straight lines in the figure. These propositions were afterwards proved by Ptolemy. To the astronomer the book is particularly interesting by the attempt made by Aristarchus to determine the ratio of the distances of sun and moon by observing their angular distance at the time when the moon was half illuminated. The very erroneous result found (19 : 1), corresponding to a solar parallax of $3'$, continued to be accepted from the time of Ptolemy to that of Kepler.

J. L. E. D.

THE APOTHEOSIS OF THE POTATO.

(1) *The Potato: A Compilation of Information from Every Available Source.* By E. H. Grubb and W. S. Guilford. Pp. vii + 545. (London: Constable and Co., Ltd., 1913.) Price 8*s.* 6*d.* net.

(2) *Commercial Gardening: A Practical and Scientific Treatise for Market Gardeners, Market Growers, Fruit, Flower and Vegetable Growers, Nurserymen, &c.* By many practical Specialists, under the Editorship of John Weathers. In four volumes. Vol. i., pp. xiii + 239 + plates; vol. ii., pp. xii + 235 + plates; vol. iii., pp. xii + 240 + plates; vol. iv., pp. xii + 244 + plates. (London: The Gresham Publishing Co., 1913.) Price 36*s.* net, the four volumes.

(1) THERE are men who, having attained to wealth and fame by the agency of some humble instrument, basely repudiate and kick over the ladder by which they have risen. Not so the authors of the first book on our list. The potato has "made" them, and in return they proceed to "make" the potato. A large number of men have at times written about this vegetable, and extracts from their books and papers occupy a very large proportion of the volume. The food value, methods of propagating, cultivating, harvesting, and selling, all receive attention, but the authors are so evidently enthusiastic, and discourse so eloquently on the merits of their subject, that we are carried along with them, and forget that, after all, they are only talking about potatoes, and not about alpine plants or roses.

The book makes one realise, as nothing else we know has quite done, how manifold are the aspects from which a simple natural object can be regarded. Successive chapters give long quotations from the writings of chemists, botanists, zoologists, entomologists, mycologists, agriculturists, engineers, economists, legislators, business men, doctors, historians, geographers, all dealing with problems directly and closely connected with the potato. And the senior author shows us enough of his personality to let us see how entirely enthusiastic the plant-fancier may become over this plant. There is nothing critical about the book, and the student of science may not find much of direct value to him. Perhaps its main interest to the general reader is that it deals with one of the humblest products of the garden in the same enthusiastic and affectionate spirit as Dean Hole wrote about roses, or Farrar about "alpines."

(2) The four volumes on commercial gardening represent a somewhat ambitious attempt to put into one work the rather wide knowledge that the successful grower ought to have of crops, manures, markets, &c.; they are frankly intended for the commercial man only. Had they been confined to practical matters we should have found little fault with them, but the scope has been widened, and chapters on "science" have been inserted. It might be argued that sound science could not fail to be useful to the grower; on the other hand, it might also be argued that the busy grower has no time to concern himself with the reasons for things, but simply wants specific, trustworthy information on his problems. Either plan might have been adopted and justified. But we do not see any justification for the third plan that has been followed of putting in poor science. While a first-hand knowledge seems to have been expected of the writers on practical subjects, no such qualification seems to have been deemed necessary in the case of science. We are not referring, of course, to Mr. Massie's and Mr. Theobald's contributions, or to some of the botanical work, which is also good, but the large sections on science are in the main distinctly poor. Some of the errors are ludicrous, and could have been corrected by any good student at an agricultural college. The distinction between

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aërobic and anaërobic decompositions proved entirely too much for the author:—

"Curiously enough, he says, "some scientists say that if air is admitted to the soil nitrogen is set free from the organic matter; and, on the other hand, if air is excluded, nitrogen is set free from the nitrates; and in both cases it is lost. These views would appear to be mutually destructive."

The chemist is still worse: when appealed to by growers to help in checking plant-diseases, "the chemist, like a sensible man of business, immediately proceeded to compound his nostrums and to talk learnedly about the fungoid and other diseases, at the same time not forgetting to take the fees to recompense him for his learning and skill."

But perhaps the most severe treatment is reserved for Rothamsted.

"The cultivation seems to be of the poorest description; in fact, it can hardly be described as cultivation at all. . . . One can imagine the condition of the soil . . . it must be almost as hard as rock, and impervious to rain, air, or roots. . . . Farming on the Rothamsted principle would appear to be a very precarious business."

As all this occurs in a science section, first-hand information was apparently deemed superfluous; nevertheless, a visit to Rothamsted first of all might not have been a bad idea. After this we are quite prepared for the author's scheme for making the wheat crop yield a profit of more than 70*l*. per acre, instead of 4*l*. or less as at present. The experimental basis consists of a trial made at Ealing in 1910 with 400 seeds; the results are multiplied up till they can be expressed in terms of one acre; and this in turn is multiplied up till the author foresees that "thousands of men would be kept on the land at better wages, and our wheat crops would be increased enormously. Agriculturists would do well to consider the above figures before smiling too broadly at them." Unfortunately, agriculturists have had these paper schemes presented to them fairly often for at least 250 years past, and now they require facts. Enough has been said, however, to show the sort of "science" that is considered good enough for growers.

E. J. RUSSELL.

TEXT-BOOKS OF PHYSICS.

(1) *Experimental Mechanics and Physics.* By A. H. E. Norris. Pp. viii+176. (London: Mills and Boon, Ltd., n.d.) Price 1*s*. 6*d*.

(2) *Elementary Physical Optics.* By W. E. Cross. Pp. 312. (Oxford: Clarendon Press, 1913.) Price 3*s*. 6*d*.

(3) *Heat: A Manual for Technical and Industrial Students.* By J. A. Randall. Pp. xiv+331. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1913.) Price 6*s*. 6*d*. net.

(4) *A Synopsis of the Elementary Theory of Heat and Heat Engines.* By J. Case. Pp. iii+65. (Cambridge: W. Heffer and Sons, Ltd., 1913.) Price 2*s*. 6*d*. net.

(5) *Elementary Principles of Electricity and Magnetism for Students in Engineering.* By Dr. R. H. Hough and Dr. W. M. Boehm. Pp. vii+233. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1913.) Price 6*s*.

(6) *Transport de Force.* Calculs Techniques et Economiques des Lignes de Transport et de Distribution d'Energie Electrique. By C. Le Roy. Deuxième Partie. Pp. 143. (Paris: A Hermann et Fils, 1913.) Price 6 francs.

(7) *First Year Course in General Science: A Combined Text-book and Note-book.* By E. A. Gardiner. Pp. vi+113. (London: W. Heinemann, n.d.) Price 2*s*. 6*d*. net.

(1) THE title of this little book is rather misleading. The use of the word "physics" suggests that the contents of the book comprise the various branches of physics, and not merely—as is actually the case—heat and a meagre treatment of a few of the properties of matter. These subjects occupy only one quarter of the volume, the remainder being devoted to mechanics. The treatment is very simple and is suitable as an introductory course. In this respect the book will no doubt serve its purpose as efficiently as many others of its class, although it exhibits no noteworthy advances in the mode of presentation of the subject. The frequent change of type is rather an unfortunate feature, and some of the diagrams are very badly drawn, notably a cube used to represent the measurement of volume, the perspective of which is in exactly the wrong sense.

(2) This book has several very good points. The subject is treated in a straightforward and lucid manner. The author has endeavoured to develop the theory of optics upon both "ray" and "wave" bases simultaneously, and we think he has succeeded. There is much to be said for both methods of treatment, and neither should be ignored. As is natural in an elementary treatise, no very difficult problems are considered, but it is rather surprising to find practically no reference to diffraction and interference, especially as some stress is laid on the wave theory. There are many simple experiments in this connection which, far from confusing a junior student, would undoubtedly interest him. One of the most notable

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